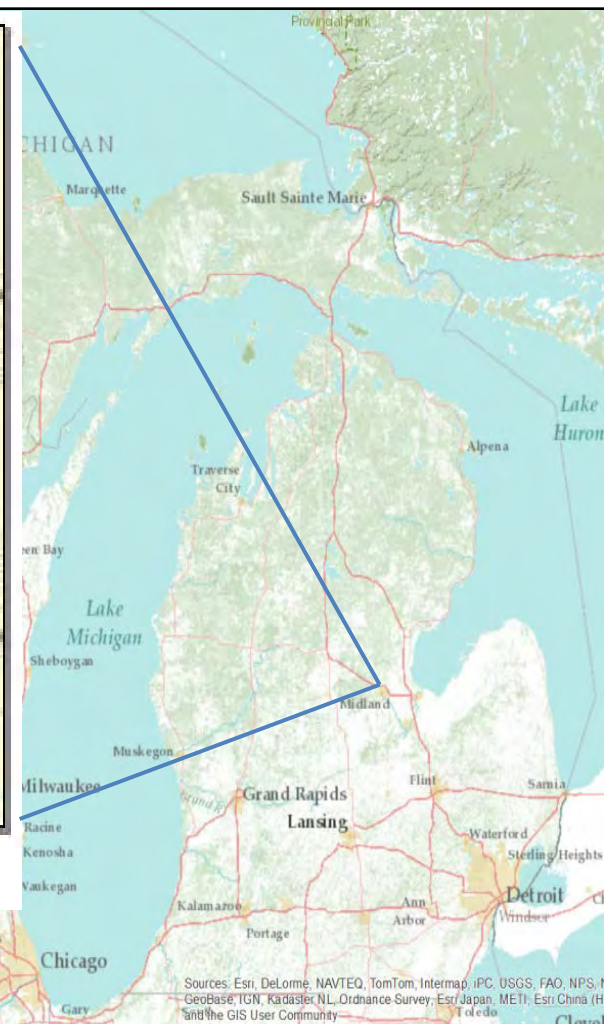
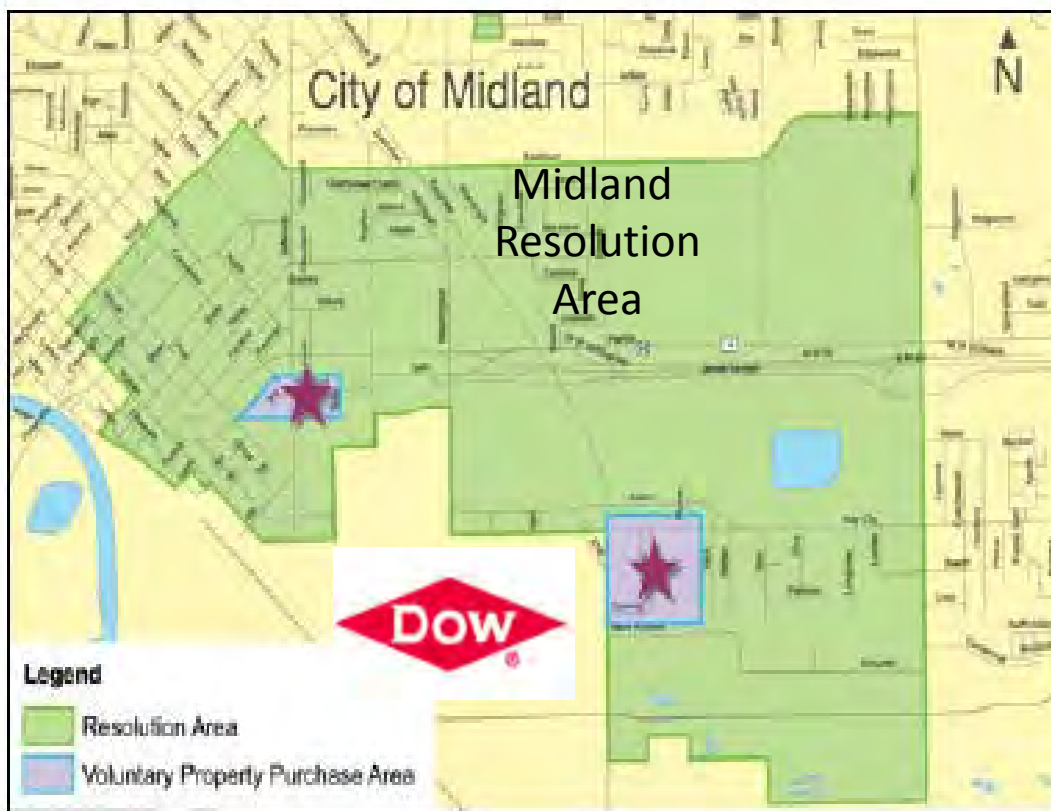


# Investigation and Remediation of Dioxin Contamination in Midland, Michigan – Update to CAG

Al Taylor

MDEQ

Office of Waste Management and Radiological  
Protection



★ Denotes Dow Property Purchase Program Areas



## Midland Area Soils Dioxin Contamination Cleanup and Restoration

- Legacy Contamination Site
  - Dioxin contamination of soils from historic releases to the air from incineration
  - Cleanup required by Dow's Hazardous Waste Operating License
- Work Plan for Cleanup Approved by DEQ's OWMRP on June 1, 2012
  - Extensive public outreach and participation
  - Midland specific action level for dioxin of 250 ppt
  - Work is phased over five years
  - 1400 residential properties to be tested and remediated as necessary
  - Designed incremental composite soil sampling approach
  - Fast analysis of samples to determine properties that need cleanup
  - Removal and replacement of top 12 inches of soil with restoration of property
  - Voluntary participation
    - Trust Fund for properties that require future cleanup

## Why are Dioxins in Midland Area Soils?

- Primarily from past burning of wastes at Dow
- Dioxins were released into the air and deposited on soils downwind from the plant

Note: Dow Michigan Operations incinerators no longer release elevated levels of dioxins (99.999% removal)

# Work Plan based on Prior Studies

- Bioavailability Studies
- Soil Characterization Study
- Indoor Dust Sampling
- Evaluation of >200 different substances
- Evaluation of depth of dioxin
- Evaluation of spatial variability of dioxin
- Pilot studies of Incremental Composite Sampling
- Development and approval of Midland soils specific dioxin analytical method

# Key Components of Approved Work Plan

- Site Specific Cleanup Criteria/Action Level (250 ppt TEQ)
- 1400 Residential Properties
- Rapid Turn Analysis
- Pilot Studies to Determine Depth of Contamination
- Designed Incremental Composite Sampling
- Decision Rules
- Removal and Replacement of top 12 inches of Soil and Restoration of Property
- Change of property use in Economic Redevelopment Zone (residential properties closest to Dow Plant Site)
- Phased over 5 years
- Trust Fund
- Adaptive Management



## Sampling and Analysis



CAG - 5-20-2013







**LEGEND**

- Increment Locations
- Property
- Roadways

Notes:  
0.13 Acres  
10 Increments

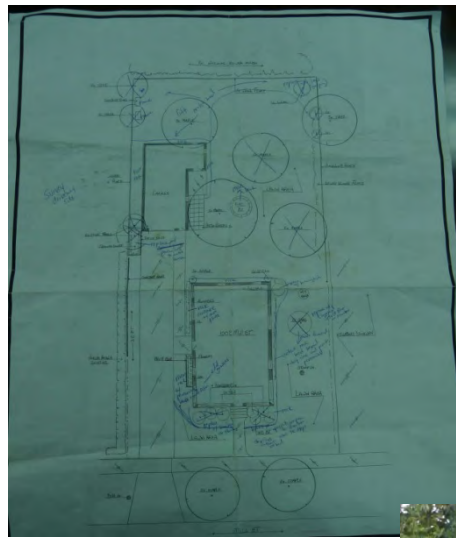
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0 15 30 60 Feet



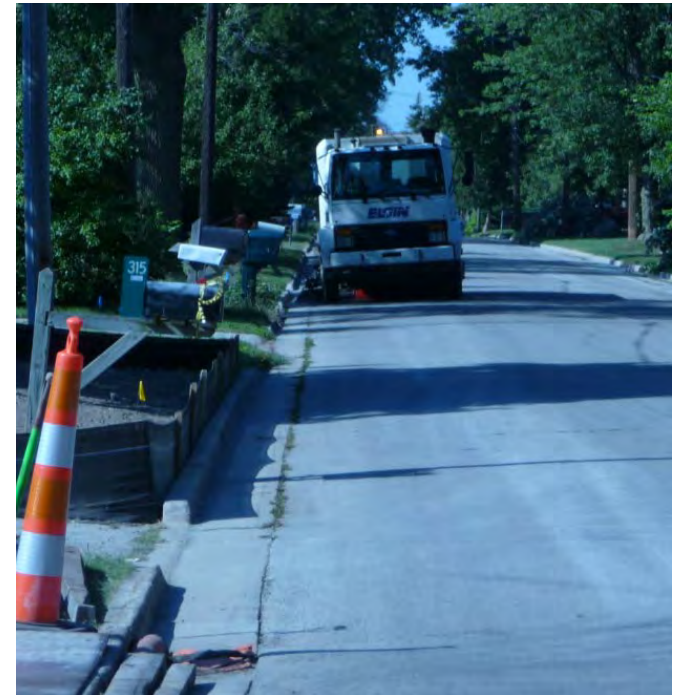
# Remediation and Restoration



# Cleanup

- Communicate results of sampling to the Property Owner
- Meet with Property owner to develop a specific plan for each individual property
  - Remove top 12” inches of soil
  - Preserve to the extent possible all non-replaceable plants and large mature trees
  - Replace with new soil, plant and establish a new lawn, replace landscaping including shrubs, flowers and bulbs
  - Return to conduct follow-up maintenance (e.g. watering) until yard is properly established
- If the current owner declines to have the work performed, funds will be set aside in a trust so that Dow can perform the work in the future









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# Remediation and Restoration





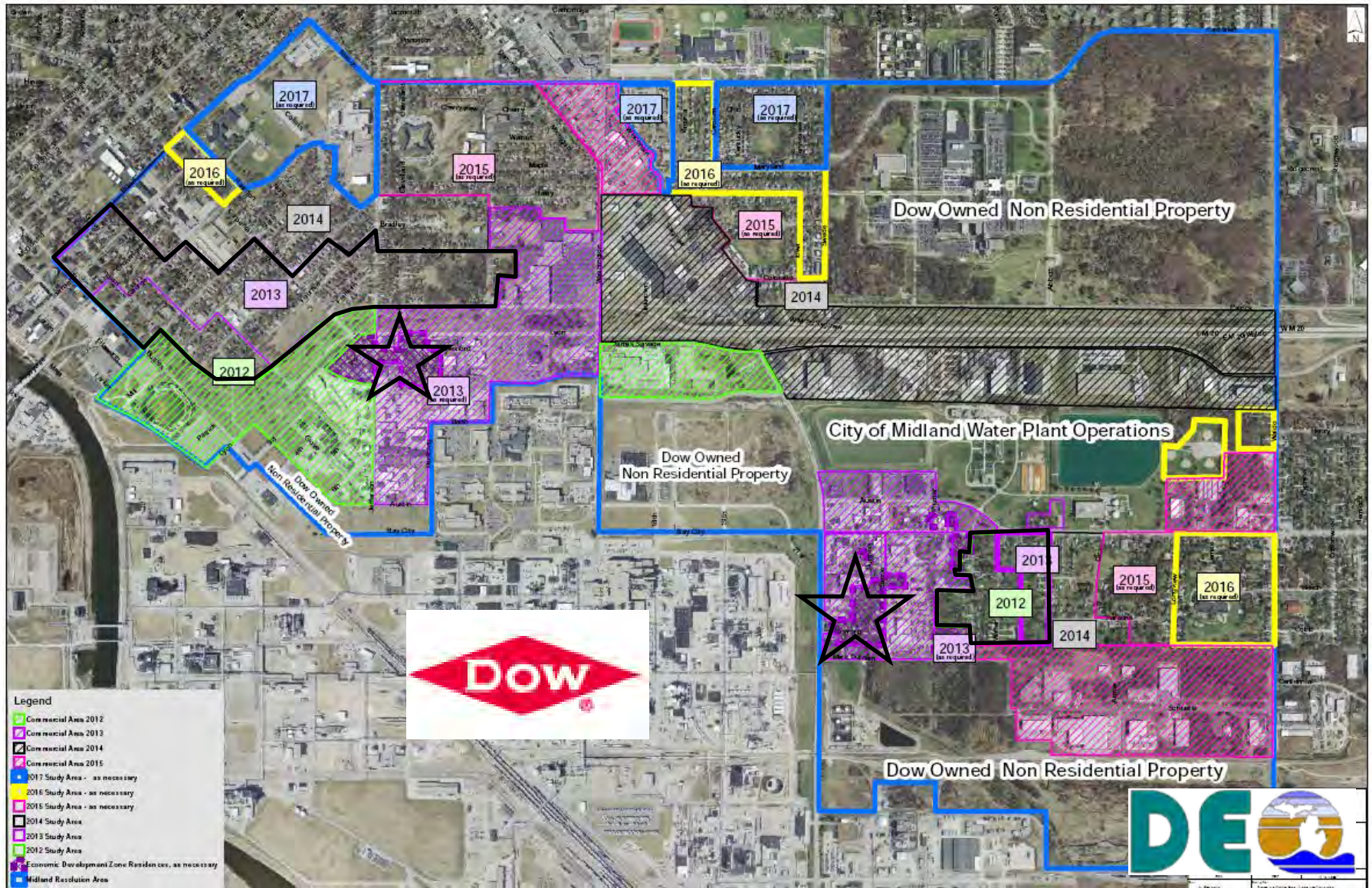
# Remediation and Restoration



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# Current Status

- **2012**

Sampling conducted at 150 properties beginning in July

- 23 properties required and received remediation based on sampling results
- Dow worked with residential property owners in the Economic Redevelopment Zone to change property use to non-residential
  - Addressed another 50 properties.

# Current Status

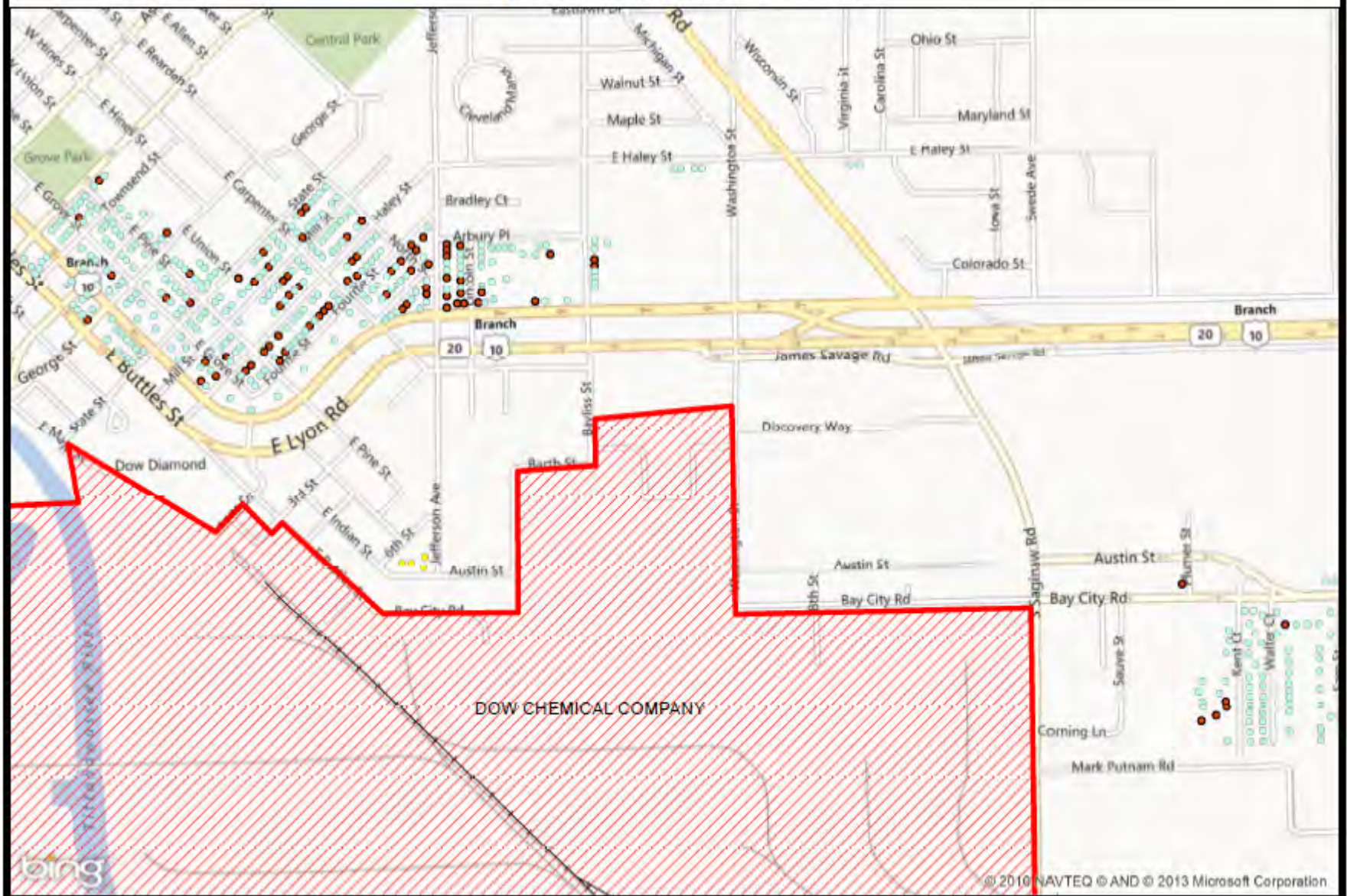
- **2013**

Early sampling was conducted at 300 of the 2013 properties beginning in the fall of 2012

- 53 properties will require remediation from this phase of sampling
- Sampling underway now to identify properties that may require cleanup in late summer/fall



# 2012-2013 Midland Area Soils



**Legend**

●	Residential, Exceeding
●	Residential, Greater Than 250
●	Non-Residential, 990 or Less
●	Residential, 250 or Less

**DEQ** OFFICE OF WASTE MANAGEMENT AND RADIOLOGICAL PROTECTION  
 Hazardous Waste Section • Permit & Corrective Action Unit  
 Map Drawn on 3/8/2013 by DRB





# Lessons Learned (to date)

- Sampling needed on every property
- Designed incremental sampling appears to work well
- Seeing more properties that need remediation as we move more North and East of plant site
  - Age of neighborhoods appears to be important
- Soil relocation is an issue
  - Relocated Tittabawassee River Floodplain Soils have been identified at several locations
- Good public outreach has resulted in excellent participation

# Information Resources

- Website: [www.michigan.gov/deqdioxin](http://www.michigan.gov/deqdioxin)
  - Q and A Documents
  - Fact Sheets
  - Work Plan
  - Health and Exposure Information
  - Links



